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NOTES ON FISHES IN THE ZOOLOGICAL MUSEUM OF STANFORD UNIVERSITY. XVII. NEW FISHES FROM JOHORE AND INDIA.

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In the fall of 1940 nearly two months were spent in collecting in Singapore, Johore, Perak, and Pinang, in the Malay Peninsula. This was followed by nearly four months in India, where field work was done from Calcutta to Trivandrum and to Krusadai, the latter in the Gulf of Manaar. Our knowledge of the distribution of both marine and fresh water fishes was greatly increased, and many rarities and a number of new species were discovered.

One of the most interesting was the discovery of a second species of *Homaloptera* in Johore, and the taking of another specimen of the one I discovered there in 1937. Many fishes hitherto known only from the rivers of Sumatra and Borneo were found to occur also in the Malay Peninsula.

In exploring the waters of such a vast area as India, the discovery of new species is to be expected. The first attempt to study the fishes of India as a whole was that of Day, whose monumental work, "The Fishes of India" appeared in 1878–88. For the past quarter of a century various Indian students, Mukerji, Prashad, Job, Law, Misra, Sundara Raj, and above all S. L. Hora, have been working mainly on the vast fresh-water fish fauna of India, with relatively little attention to brackish water and estuarine fishes. The explorations of the "Investigator" and the "Golden Crown", and the studies by Alcock, Annandale, and Jenkins of the fishes thus obtained, were the only attempts to study seriously the marine fishes of India during

the last forty years. When proper effort is bestowed upon studies of the littoral and off-shore fishes of India, and large collections made by modern intensive methods along the Coromandel, Malabar, and Sind coasts, a wealth of new and little known fishes may be expected.

Types of the new species here described are in the Natural History Museum of Stanford University. Lengths mentioned are the standard length.

The Atherinidae or silver-sides are silvery fishes, most of them small and slender, occurring in large shoals in all tropical and temperate seas. The principal member of the sub-family Atherininae is the genus *Atherina*, which occurs throughout and has given rise to a number of other genera which gradually diverge from it in appearance and structure. The most highly specialized genus of this assemblage is *Iso*, hitherto known from three widely separated localities, Japan, Australia, and Natal, South Africa. *Iso natalensis* is known only from a single example, 52 mm. long, imperfectly described and poorly figured. I have examined ample material of the Japanese and Australian species, and find them markedly different from each other and from the Indian species. The species are surf dwellers, and it was a great surprise and pleasure to find *Iso* living in the surf of Indian shores.

While *Iso* is evidently derived from *Atherina*, it is strikingly dissimilar. The body is very much compressed, deepest just behind the head, and has a keel along the belly. The head is as deep as long; the two dorsals are well separated; the second dorsal is like the anal but shorter, the anal with 21 to 27 rays. The head and anterior dorsal and ventral regions are scaleless. In life *Iso* is translucent, with a broad brilliant silvery band from behind the pectoral fin to the caudal peduncle or caudal base.

Iso flos-indicus Herre, new species.

Dorsal IV or III–I–13 to 15; anal I–21 to 24; scales in a lateral series 40 to 44; gill rakers 3 plus 10.

The depth is 3.33 to 3.53, the head 4.4 to 4.5, the caudal 4.66 to 5 times in the length. The eye is 2.9 to 3.1 times in the head and may be more or less than the snout and postorbital, but usually equals the snout and is a little less than the postorbital. The mouth is very oblique, the maxillary sometimes extending to beneath the anterior part of the eye, but usually not reaching a vertical from the anterior margin of the eye. There are 3 rows of teeth in the upper jaw, those of the outer row curved, widely spaced, and much larger than the others; they remain outside the mouth when it is closed, and above this row one or two additional rows of small teeth are usually present. The toothed outer surface of the maxillary is conspicuous in this species; as far as known, the other members of this genus have the maxillary smooth externally. No vomerine teeth were found.

The scales are more or less deciduous, but the scalation conforms to the

generic pattern. The greatest depth is over the pectoral base; in the smallest specimens the greatest depth is over the gill opening, at the hind margin of the head. As specimens become larger the greatest depth moves posteriorly. The pectorals are placed very high up; any further upward position would place them on the back. In general, this species agrees in form and proportions with the other species, which all have a strong similarity.

The color in alcohol is gray or yellowish, the sides of the head bright silver; a broad silver band extends from behind the pectoral base to the caudal peduncle where it pinches out, to reappear as a silvery black spot on the caudal base. A black line forms the upper margin of the silver band, which may be perfectly clear, but is usually more or less sprinkled with black dots. The breadth of the silver band equals or is less than the diameter of the eye, and is much less than the length of the ventrals; it is noticeably narrower than in *Iso flos-maris*, where the silver band is wider than the eye and equals the length of the ventral fin. The width of the silver band in *Iso rothotophilus* is greater than in *Iso flos-indicus*, but less than in *Iso flos-maris*. On the occiput is a large brownish-yellow spot, more or less dotted with black. The upper and lower lips are dotted with black. The fins are colorless.

Described from the type, 42 mm. long, and 25 paratypes 23 to 40 mm. long, collected in the surf on the beach at Vizagapatam. Two paratypes, 36 and 37 mm. in length, were taken from the surf in a rocky cove at Konival, 10 miles south of Trivandrum, Travancore, India. This pretty little fish probably occurs on sandy beaches and rocky places along the entire coast of India.

Flos-indicus, flower of India.

KEY TO THE SPECIES OF ISO.

A. Maxillary without external teeth.
B. With vomerine teeth; scales about 59.....*ISO FLOS-MARIS*
(Distribution, Japan)
BB. Vomerine teeth lacking or not yet known
C. Scales 49; depth 3.5; dorsal IV–I–14–16; anal I–23–27.....*ISO ROTHOPHILUS*
(Distribution, New South Wales)
CC. Scale count not known; depth 3.25; dorsal IV–I–16; anal I–22.....*ISO NATALENSIS*
(Distribution, Durban, Natal)
AA. Maxillary with external teeth; scales 40–44; dorsal IV or III–I–13–15; anal I–21–24.....*ISO FLOS-INDICUS*
(Distribution, Coromandel and Malabar coasts of India)

Ctenogobius andhraensis Herre, new species.

Dorsal VI–I–10; anal I–9; pectoral 18; scales in lateral series 28, rarely 29, with at least 4 rows of small scales on the caudal; scales in transverse series 8; predorsal scales small, 14 to 16, not extending to the eyes.

The body is moderately slender, the dorsal profile nearly horizontal,

the ventral outline gently convex, the last third of the body laterally compressed. The depth is about 5 times in the length, but in a female full of eggs it is less than 4.3. The head and caudal are approximately equal in length, 3.47 to 3.65 in the length, or the caudal may be a little shorter than the head. The eye is high up, dorso-lateral, in the front half of the head, in which it is contained 4.2 to 4.5 times. The distance from the hind margin of the eye to the tip of the snout is usually less, but sometimes is equal to the postorbital region. The interorbital is narrow, 2.5 to 2.7 times in the eye. The strongly convex snout is longer than the eye, 3.3 to 3.4 times in the head. The mouth is moderately oblique, the jaws equal, the posterior angle of the maxillary extending beneath the anterior part of the eye, or the front margin of the pupil. The upper jaw has a short outer row of 6 or 8 caniniform teeth, with 3 rows of very small teeth behind it. The lower jaw has 4 rows of teeth, the outer one slightly enlarged, with a large lateral curved canine, which in old males is visible when the mouth is closed. The free tip of the tongue is rounded.

The scales are large and ctenoid, except on the nape, pectoral base, preventral region, and belly, where they are cycloid. The first dorsal spines have filiform tips, not elongated in females, 6.8 or 6.9 times in the length and not reaching the second dorsal when depressed; males have the tips of the first and second spines much elongated and thread-like, extending upon the second dorsal when depressed, 4.6 to 3.9 times in the total length. The last ray of the second dorsal is elongate, 6.8 or 6.9 times in the total length. The last ray of the second dorsal is elongate, 6.8 or 6.9 times in the length in adult females and not reaching the caudal, but extending upon the caudal in adult males and 6 to 6.1 times in the length. The last anal ray equals the last dorsal ray but does not reach the caudal when depressed. The broad pectoral is 4 to 4.5, the ventral 4.5 to 5 times in the length, the latter not reaching the anus by one or two scales. A row of minute sensory papillae extends longitudinally across the middle of the cheek, and another nearly parallel one extends back from near the posterior angle of the maxillary; several rows of very minute papillae curve downward from the eye to the median longitudinal row; a vertical row on the opercle parallels its front margin. Five large mucus pores are along the groove extending from the eye and above the opercle, and another large pore is in the front part of the interorbital space. The anal papilla of females is short and semi-globose; that of males is thin, slender, and pointed.

The color in alcohol is pale yellowish gray, with 5 dusky spots in a median longitudinal row along the side, connected by a faint dusky line which extends to the tip of the caudal, but has faded in most specimens. The first spot is under the pectoral, the last one just before the caudal. On the back are indications of 8 dorsal cross bands; on the base of the upper 6 or 8 caudal rays is a white-margined blackish ocellus; just above the upper posterior angle of the opercle is a large dark blue or blackish blue spot with pearly lustre; on the upper part of the pectoral base is a brown spot, and some specimens show a similar but smaller spot on the

basal portion of the pectoral rays. In life the sides of the head and pectoral base were evidently nacreous, vestiges of their pearly lustre being still visible on some specimens. All the fins except the pectorals are more or less densely stippled with blackish dots.

Described from the type, a male 60 mm. long, 15 female paratypes 31 to 59 mm. long, and 13 male paratypes 29 to 55 mm. long. The largest female was ready to spawn when taken and is much bulkier than the type. Another female 55 mm long contains many eggs but is not nearly ready to spawn. These specimens were taken among the rocks on the beach at Vizagapatam, India.

Andhraensis, from Andhra, the ancient name of that part of India.

Tripterygion ellioti Herre.

Tripterygium trigloides Day, Fishes India, p. 336, 1888; (not of Bleeker).

Dorsal III–XIII–8–9–10; anal usually 18, but varying from 16 to 19; pectoral 14–16, the upper 8 or 9 rays divided, the lower 6 or 7 simple; lateral line scales 35 or 34.

Adults have the depth 4.5 to 4.7, the head 2.9 to 3.2, the pectoral 3.2 to 3.6, the ventral 4.25 to 4.5 times in the length; the caudal equals the depth. The head is very large and broad, with nearly vertical snout and prominent lips which are equal or the lower one slightly inferior, its physiognomy Trigla-like. The eye is large, high up, 3.3 to 3.4 times in the head, usually a little longer than the snout. The narrow interorbital is a third, or sometimes half an eye diameter in breadth. The mouth is rather large, slightly oblique, the angle of the maxillary beneath the front third or half of the eye. There is a short broad black tentacle on the upper part of the eye, its tip more or less short lobate or fringed; a similar but pale tentacle is on the nostril. Very young specimens, 8 to 12 mm. long, have the spinous dorsal continuous, so that there are but two dorsals. The two anterior spines grow very little, the third one not at all, so that by the time a fish is 18 mm. long the first three spines are separated from the rest and there are two spinous dorsal fins. Adult males may have the first spine of the first dorsal somewhat elongated, but none of the spines or rays become noticeably long.

In life adult males are brilliantly and beautifully colored. The trunk is suffused with reddish or orange, each scale outlined with dark dots; there is a brilliant blue ocellus on the pectoral base, margined with red, orange, or golden; the whole under side of the head, up to the eyes, is usually brilliant blue, but may be only heavily dotted with dark blue; the eyes and interorbital are golden red or orange; the abdomen and ventrals are also golden red; the anal is brilliant dark blue like the under side of the head; the second spinous dorsal has a basal blue band, the rest of the fin red or golden, with a marginal blue line; the first spine of the first dorsal is blue, the rest of the fin red or golden; the soft dorsal is colored like the second spinous dorsal, but is less brilliant; the caudal is largely bluish.

In alcohol the body is uniform brown, and the blue of the head and pectoral ocellus becomes black or dark bluish brown. The red and

golden of body and fins become whitish or pale, but the top of the eye is still reddish golden; the fins turn more or less dusky brown, their red bands colorless, while the ventrals and abdomen are pale yellowish.

Females and young males are much paler as a rule, with little or no high coloring, though some females are handsomely but not brilliantly colored. Adult females may have an ocellus more or less developed on the pectoral base, but it is never so large, brilliant, or glowingly margined as in males; it is often absent, merely represented by one or more small spots. The ground color of the body is pale golden or reddish, barred by 6 cross bands, each of which divides into two on the lower half of the body; the first bar is just behind the pectoral base, the last one before the caudal; the sides of the head are more or less spotted with reddish dots. The pectorals are cross-barred with 3 to 5 rows of reddish spots, and the caudal fin has 2 or 3 dark cross-bands; the vertical fins are clear, cross-barred by 1 to 3 rows of red brown dots. In alcohol the ground color is largely greenish gray, the spots darkened.

This little fish is no doubt abundant around rocks on all coasts of peninsular India. From the rocks on Maharanepeta Beach, Vizagapatam, were taken 120 specimens, from 20 to 36 mm. in length. Among the rocks at Waltair beach 2 or 3 miles further north, 40 specimens were taken, 38 of them 20 to 30 mm. in length; 2 others, 8 and 11.5 mm. in length, illustrate the original condition of the dorsal fin, as described above. From around rocks at Lawson's Bay, north of Waltair, 8 examples, 10 to 30 mm. in length, were secured. From a rock pool at Konival, 10 miles south of Trivandrum, Travancore, a single adult male, 32 mm. long, was collected. Others were seen but the sea became too rough to work among the rocks. The types are a male 32 mm. long and a female 36 mm. long, from Maharanepeta Beach, Vizagapatam; all those remaining are paratypes.

Day never saw a specimen of *Tripterygion* in India, but amongst Sir W. Elliot's drawings were colored illustrations of a male and a female of this genus. Specimens destined for Europe were destroyed in a storm, Dr. Day states. From these drawings Day gave a description and thought the species might be the *Tripterygion trigloides* of Bleeker. But this is impossible, for Bleeker's species has 50 to 55 scales, besides other marked differences, and also lacks the brilliant coloration characteristic of males of the present species. The fish observed by Sir W. Elliot has apparently never been taken by anyone else until my visit to Vizagapatam in December, 1940, and is without a name. I therefore take pleasure in giving it the name of its original discoverer.

Sir Walter Elliot, an official of the Madras Civil Service, employed native artists to make colored illustrations of the fishes of Madras and Waltair. Day says that they were beautiful and accurate, and comprised many hundred species, each with its native name attached, as well as Jerdon's identifications.

HOMALOPTERA van Hasselt, **emend.** van der Hoeven.

Neohomaloptera Herre, new sub-genus.

From Homaloptera as defined by Dr. S. L. Hora, in his monograph "Classification, Bionomics and Evolution of Homalopterid Fishes,"

Memoirs Indian Museum, Vol. XII, pp. 263–330, 1932, *Neohomaloptera* differs in the following respects:—Two pairs of barbels at the angle of the mouth, instead of but one; the rays of the pectoral and ventral reduced in number, the former with 12 or 13 instead of 14 to 20, the latter with 7 instead of 8 to 10; the pectoral further has but 3 or 4 simple rays, instead of 4 to 8. The caudal is slightly rounded, not forked or emarginate, as in typical *Homaloptera;* the caudal peduncle is short and as deep as long. The type of the sub-genus is Homaloptera johorensis Herre, new species.

Homaloptera (Neohomaloptera) johorensis Herre, new species.

Dorsal I–7; anal II–5 or I–5; pectoral with 8 or 9 divided and 3 or 4 simple rays; ventral II–5; scales in the lateral line 32, plus 1 or 2 on the caudal base; 14 to 16 predorsal scales and 16 around the caudal base.

The depth is 5 to 5.1, the head 3.7 to 4, the caudal 4 to 4.1, the pectoral 3.6 to 4, the ventral about 5.2 times in the length. The eye is 4.25 to 4.5 in the head; the snout equals the postorbital part of the head, 2.2 in the head; the interorbital breadth is approximately twice the eye; the least depth of the caudal peduncle equals its own length.

The body is rather stout, its breadth nine-tenths of its height, the ventral profile straight and horizontal, the dorsal profile slightly arched and deepest at the dorsal origin, the head and predorsal region feebly depressed. The eyes are dorso-lateral, very high up. The snout is broadly rounded, its inner barbels equal to the eye, the longer outer pair 1.5 times the eye; the outer barbel on the maxillary angle is longer than the eye; the slender inner maxillary barbel is about a third as long as the outer one. The dorsal origin is opposite the 14th scale and well behind the ventral origin, which is opposite the tenth scale; that of the anal is opposite the 26th scale. The pectoral scarcely reaches the ventral origin. The rounded caudal equals or is less than the head; the dorsal height is 4.5 to more than 5 times in the length; the low anal is 6.4 to 7.2 in the length. The head is naked, the body scaled except on the ventral surface, which is naked as far back as the hind end of the ventral base.

The color in alcohol is more or less brown, everywhere stippled with minute black specks, interspersed with large circular black dots. On the posterior half of the smaller specimen are four broad black transverse bands, which are forked below the lateral line; on the larger specimen these bands only show above the anal and on the caudal peduncle. The dorsal has two transverse rows of black dots, and the caudal has one or two blackish cross bars. The other fins are colorless.

The type, 20.5 mm. long, and paratype, 18 mm. long, were taken from a brook near Simpang Rengam, Johore.

Homaloptera tweediei Herre.

From a brook near Kota Tinggi, Johore, I collected a specimen of this little species, 19 mm. long. This is the second record, my previous collection having been made in the Mawai district, Johore, about 15 miles further north than Kota Tinggi.